

TABLES

Table 2-1. Summary of Available Soil Data for the VBI70 OU2 Site

Investigation	Sample Date	Number of On-Site Soil Samples	Sample Description	Analytes
Phase I Remediation Investigation for VBI70 OU2 (Envirogroup 2004, EMS Inc. 2008)	2008	14	surface soil samples collected from 14 locations over the top foot of soil (0-12" bgs or 0-12" bps)	As, Pb
		33	subsurface soil samples collected from 14 locations, samples composited over 5 foot depth intervals (one grab sample per foot) at depths up to 20' bgs or 20' bps	As, Pb
	2005	25	surface soil samples, 5-8 point composite samples collected from areas of currently exposed soil	As, Cd, Pb, Zn
		41	subsurface soil samples collected from 10 locations (7 soil borings; 3 on-site monitoring wells); samples collected from the top 6-8" of each horizon at depths up to 20' bgs	As, Cd, Pb, Zn
Brighton Boulevard Brownfield Phase II Targeted Site Assessment (URS 2004)	4/21/2003 to 5/23/03 and 1/5/2004 to 1/20/2004	6	subsurface composites over top coring interval (0-3' or 0-4')	TAL Metals
CCOD Barn Soil Excavations (CH2M Hill 2004)	10/22/2003	2	surface soil samples (composites from soil surrounding excavation areas)	As, Ba, Cd, Cr, Pb, Hg, Se, Ag
	10/22/2003	5	subsurface soil samples composited over depth (0-5') and 1 grab sample from bottom of excavation	As, Ba, Cd, Cr, Pb, Hg, Se, Ag
Globeville Landing Park Soil Sampling [1] (CH2M Hill 2002)	10/2002	67	subsurface soil samples collected from 32 locations and composited over depth intervals of 0-2' and 2-3' bgs. At 3 locations, additional samples were collected over 4-6' bgs	As, Pb
Pepsi Bottling Group Soil Testing for Lead and Arsenic (Transportation and Industrial Services, Inc. 2001)	8/2001 to 1/2002	87	subsurface composites over coring intervals of 0-1.2' up to 0-12' bgs	As, Pb
CDOT (Walsh 1991 and 1997)	1991 (for TH-X stations) 5/30/97 to 6/2/97 (for DC-X stations)	6	subsurface composited over borehole depth 11.5 to 22' bgs	As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, V, Zn

[1] Data from the Globeville Landing Park Investigation were excluded from this risk evaluation. This area been removed from the VBI70 OU2 Superfund Site Study Area (USEPA 2003).

bgs = below ground surface

bps = below pavement surface

Table 2-2. Summary of Surface Water and Sediment Data for the VBI70 OU2 Site

Investigation	Media	Sample Date	Number of Samples		Sample Description	Analyses
			Upstream	Downstream		
CCOD Surface Water Monitoring February - September 2005 (Envirogroup 2004)	Surface Water	2/2005 - 9/2005	0	8	grab samples collected monthly from 1 downstream location (N46), from February - September 2005.	As, Cd, Cu, Pb, Zn (dissolved only)
Phase I Remediation Investigation for VBI70 OU2 (CCOD 2006)	Surface Water	2005 - 2006	4	4	grab samples collected from 2 locations (N43 and N46) over 4 quarters.	As, Cd, Cu, Pb, Zn (dissolved and total)
	Sediment	2005 - 2006	4	4	grab samples collected from 2 locations (N43 and N46) over 4 quarters.	As, Cd, Cu, Pb, Zn (total)

**Table 2-3. Summary Statistics for Chemicals Measured in
On-Site Surface Soil and Sub-Surface Soil**

A. Surface Soil (0-1 foot)

Chemical	Total Number of Samples	Detection Frequency	Concentration ^[1] (mg/kg)		
			Minimum	Maximum	Average
Aluminum	6	100%	5,870	7,370	6,803
Antimony	6	83%	3.0	13	6.0
Arsenic	94	89%	1.4	510	38
Barium	8	100%	137	954	388
Beryllium	6	0%	0.5	0.5	0.5
Cadmium	43	98%	0.5	100	8
Calcium	6	100%	2,690	25,900	9,313
Chromium	8	100%	8.0	17	11
Cobalt	6	100%	3.0	4.0	3.3
Copper	6	100%	36	681	253
Iron	6	100%	12,000	53,200	22,033
Lead	83	100%	2	34,000	1,057
Magnesium	6	100%	1,370	3,350	2,035
Manganese	6	100%	328	8,340	2,011
Mercury	8	38%	0.0	2.0	0.3
Nickel	6	100%	5.0	7.0	5.7
Potassium	6	100%	1,700	3,350	2,288
Selenium	8	25%	0.6	3.5	2.8
Silver	8	100%	0.3	45	11
Sodium	6	100%	179	1,360	500
Thallium	6	100%	1.0	15	4.5
Vanadium	6	100%	18	24	20
Zinc	41	100%	77	14,000	1,211

[1] Non-detects adjusted to 1/2 detection limit

B. Sub-surface Soil (>1 - 10 feet)

Chemical	Total Number of	Detection Frequency	Concentration ^[1] (mg/kg)		
			Minimum	Maximum	Average
Arsenic	97	91%	0.3	950	29
Barium	5	100%	89	180	138
Cadmium	20	80%	0.3	150	15.7
Chromium	5	100%	4.5	13	10
Lead	97	100%	1.1	3,600	319
Mercury	5	100%	0.1	0.1	0.1
Selenium	5	100%	0.5	0.8	0.7
Silver	5	100%	0.6	4	2
Zinc	15	100%	26	19,000	1,787

[1] Non-detects adjusted to 1/2 detection limit

Table 2-4. Summary Statistics for Chemicals Measured in Surface Water and Sediment

A. Surface Water

Site Area	Chemical	Fraction	Concentration ^[1] (mg/kg)		
			Minimum	Maximum	Average
Upgradient (N43)	Arsenic	Dissolved	0.65	1.6	1.1
		Total	1	1.5	1.2
	Cadmium	Dissolved	0.02	0.16	0.1
		Total	0.1	0.18	0.14
	Copper	Dissolved	0.93	4	3.1
		Total	4	6.4	5.2
	Lead	Dissolved	0.09	0.35	0.23
		Total	0.37	4.6	1.7
Downgradient (46)	Zinc	Dissolved	5	30	20
		Total	23	35	32
	Arsenic	Dissolved	0.73	1.7	1.3
		Total	1.1	1.2	1.2
	Cadmium	Dissolved	0.014	0.16	0.1
		Total	0.14	0.17	0.15
	Copper	Dissolved	1.2	6.2	3
		Total	4.7	13	7.5
	Lead	Dissolved	0.038	4.9	0.52
		Total	0.44	5.4	2
	Zinc	Dissolved	6.9	30	20
		Total	30	40	36

[1] Non-detects adjusted to 1/2 detection limit

B. Sediment

Site Area	Chemical	Fraction	Concentration ^[1] (mg/kg)		
			Minimum	Maximum	Average
Upgradient (N43)	Arsenic	Total	1.2	1.9	1.5
	Cadmium	Total	0.46	0.88	0.61
	Copper	Total	15	20	17
	Lead	Total	27	550	160
	Zinc	Total	83	110	100
Downgradient (N46)	Arsenic	Total	1	1.5	1.2
	Cadmium	Total	0.29	0.57	0.39
	Copper	Total	10	19	14
	Lead	Total	20	31	25
	Zinc	Total	77	110	100

[1] Non-detects adjusted to 1/2 detection limit

**Table 3-1. Comparison of Off-Site Surface Soil Samples Collected
Near the VBI70 OU2 Site to Risk-Based Concentration Levels for Workers**

Chemcial	Properties (n)	Surface Soil Concentration (mg/kg)		Risk-Based Concentration (mg/kg)		Number of Locations That Exceed the RBC (c)	
		Average	Maximum	Commercial Worker	Construction Worker	Commercial Worker	Construction Worker
arsenic	2,969	33	1,517	907 (a)	850 (a)	3 (<1%)	6 (<1%)
lead	2,969	218	2,546	1986 (b)	2085 (b)	0 (0%)	0 (0%)

(a) RBCs for arsenic based on target cancer risk of 1E-04 (commercial worker) or target noncancer hazard quotient of 1E+00 (construction worker), site-specific arsenic soil RBA of 0.42, and the exposure parameters listed in Tables 3-3 and 3-4.

(b) RBCs for lead based on target blood lead level of 10 ug/dL for a fetus based calculated using EPA's Adult Lead Model, a site-specific lead soil RBA of 0.84, and the Adult Lead Model (ALM) input parameters listed in Table 3-7.

(c) Based on the mean concentration of lead in soil and the 95th UCL concentration of arsenic at a property.

**Table 3-2. Quantitative Chemicals of Potential Concern
for the Human Health Risk Assessment**

Chemical	Soil	Sediment	Surface Water
Aluminum			
Antimony	X		
Arsenic	X	X	X
Barium			
Beryllium			
Cadmium	X	X	X
Calcium			
Chromium			
Cobalt	X		
Copper	X	X	X
Iron	X		
Lead	X	X	X
Magnesium			
Manganese	X		
Mercury			
Nickel			
Potassium			
Selenium			
Silver	X		
Sodium			
Thallium	X		
Vanadium	X		
Zinc	X	X	X

**Table 3-3.
Exposure Parameters for Current/Future Commercial Workers**

Exposure Pathway	Exposure Input Parameter	Units	CTE		RME	
			Adult	Source	Adult	Source
General	Body Weight	kg	70	[1, 3]	70	[1, 3]
	Exposure frequency	day/yr	219	[3]	250	[3]
	Exposure duration	yr	5	[3]	25	[4]
	Averaging Time, Cancer	yr	70	[1, 2, 3]	70	[1, 2, 3]
	Averaging Time, Noncancer	yr	5	[3]	25	[3]
Ingestion of Soil	Ingestion rate	mg/day	25	[6, a]	50	[4]
	Conversion factor	kg/mg	1.00E-06	--	1.00E-06	--
	HIF(noncancer)	kg/kg-d	2.14E-07		4.89E-07	
	HIF(cancer)	kg/kg-d	1.53E-08		1.75E-07	

CTE = Central Tendency Exposure

HIF = Human Intake Factor

RME = Reasonable Maximum Exposure

Sources:

[1] USEPA 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03. March.

[2] USEPA 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002. December.

[3] USEPA 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

[4] USEPA 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.

[5] USEPA 1997. Exposure Factors Handbook.

[6] Professional judgment.

Notes:

[a] Assumes CTE soil ingestion is half of the RME.

[b] Assumes CTE value for worker is half of the CTE value for a resident.

**Table 3-4.
Exposure Parameters for Current/Future Construction Workers**

Exposure Pathway	Exposure Input Parameter	Units	CTE		RME	
			Adult	Source	Adult	Source
General	Body Weight	kg	70	[1, 3]	70	[1, 3]
	Exposure frequency	day/yr	26	[5, b]	65	[5, c]
	Exposure duration	yr	5	[5, b]	5	[5, b]
	Averaging Time, Cancer	yr	70	[1, 2, 3]	70	[1, 2, 3]
	Averaging Time, Noncancer	yr	5	[5]	5	[5]
Ingestion of Soil	Ingestion rate	mg/day	165	[6, a]	330	[4]
	Conversion factor	kg/mg	1.00E-06	--	1.00E-06	--
	HIF(noncancer)	kg/kg-d	1.68E-07		8.40E-07	
	HIF(cancer)	kg/kg-d	1.20E-08		6.00E-08	

CTE = Central Tendency Exposure

HIF = Human Intake Factor

RME = Reasonable Maximum Exposure

Sources:

[1] USEPA 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03. March.

[2] USEPA 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002. December.

[3] USEPA 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

[4] USEPA 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.

[5] Professional judgment

Notes:

[a] Assumes CTE value is half of the RME value.

[b] Assumes 2 days/week for 13 weeks (26 days/year).

[c] Assumes 5 days/week for 13 weeks (65 days/year).

Table 3-5.
Exposure Parameters for Hypothetical Future Residents

Exposure Pathway	Exposure Parameter	Units	CTE				RME			
			Adult	Source	Child	Source	Adult	Source	Child	Source
General	Body Weight	kg	70	[1, 3]	15	[1, 3]	70	[1, 3]	15	[1, 3]
	Exposure frequency	days/yr	234	[3]	234	[3]	350	[3]	350	[3]
	Exposure duration	years	7	[3]	2	[3]	24	[3]	6	[3]
	Averaging Time, Cancer	yr	70	[2]	70	[2]	70	[2]	70	[2]
	Averaging Time, Noncancer	yr	9	[2]	9	[2]	30	[2]	30	[2]
Ingestion of Soil	Ingestion rate	mg/day	50	[3]	100	[3]	100	[1,3]	200	[1,3]
	Conversion factor	kg/mg	1.00E-06	--	1.00E-06	--	1.00E-06	--	1.00E-06	--
	HIF(noncancer)	kg/kg-d	1.31E-06			[b]	3.65E-06			[b]
	HIF(cancer)	kg/kg-d	1.68E-07			[b]	1.57E-06			[b]

CTE = Central Tendency Exposure

HIF = Human Intake Factor

RME = Reasonable Maximum Exposure

Sources:

- [1] USEPA 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03. March.
- [2] USEPA 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002. December.
- [3] USEPA 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
- [4] USEPA 1997. Exposure Factors Handbook.
- [5] Professional judgment.

Notes:

- [a] Child resident intake assumed to be half that of an adult resident.
- [b] Calculated value.

Table 3-6.
Exposure Parameters for Current/Future Recreational Visitors (child/adolescent, 7-15 years old)

Exposure Pathway	Exposure Input Parameter	Units	CTE		RME	
			Child	Source	Child	Source
General	Body Weight	kg	41.3	[4, a]	41.3	[4, a]
	Exposure Frequency	days/yr	44	[5, b]	88	[5, b]
	Exposure duration	yr	2	[3]	8	[5]
	Averaging Time, Cancer	yr	70	[2]	70	[2]
	Averaging Time, Noncancer	yr	2	[2]	8	[5]
Ingestion of Sediment	Ingestion rate	mg/day	25	[5, d]	50	[5, e]
	Conversion factor	kg/mg	1E-06	--	1E-06	--
	HIF(noncancer)	kg/kg-d	7.30E-08		2.92E-07	
	HIF(cancer)	kg/kg-d	2.08E-09		3.34E-08	
Ingestion of Surface Water	Ingestion rate	mL/hour	5	[5, h]	30	[7, g]
	Exposure Time	hr/day	0.5	[5, 8]	1.5	[5, 8]
	Conversion factor	L/mL	1E-03	--	1E-03	--
	HIF(noncancer)	L/kg-d	7.30E-06		2.63E-04	
	HIF(cancer)	L/kg-d	2.08E-07		3.00E-05	

CTE = Central Tendency Exposure

HIF = Human Intake Factor

RME = Reasonable Maximum Exposure

Sources:

[1] USEPA 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. OSWER Directive 9285.6-03. March.

[2] USEPA 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002. December.

[3] USEPA 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

[4] USEPA 1997. Exposure Factors Handbook.

[5] Professional judgment.

[6] Jefferson County, Colorado Open Space 1996. Jefferson County Open Space Trail Usage Survey. Golden, CO.

[7] USEPA 1998. Draft Water Quality Criteria Methodology Revisions.

[8] SAF. 2000. Final. Remedial Investigation Report. Zone A. Operable Unit 3: Landfill 6. Volume 3. Appendix K. Baseline Risk Assessment May 15. (FE Warren Site).

[9] USEPA 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). OSWER 9285.7-02EP. July.

Notes:

[a] Table 7-3, mean of male and female ages 7 - 15.

[b] Assumes exposure occurs May-September at a frequency of 2 visits/week and 4 visits/week, for a CTE and RME child, respectively.

[d] Assumes CTE ingestion rate is half of the RME ingestion rate.

[e] Assumes RME sediment ingestion is same as CTE soil ingestion.

[g] 30 mL/hr is the basis for the 10 mL/day value proposed for a recreational scenario by the Draft Water Quality Criteria Methodology Revisions (USEPA 1998).

[h] Incidental ingestion from splashing or hand-to-face contact during wading assumed to be 10% of USEPA (1989) recommended default (50 ml/hr) incidentally ingested during swimming.

Table 3-7. Adult Lead Model Inputs

Parameter	Unit	Commercial Worker	Construction Worker	Residential Child (7-15 years)	Source	Basis
PbB0	ug/dL	1.7	1.7	1.7	AGEISS 1996	
BKSF	ug/dL per ug/day	0.4	0.4	0.4	USEPA 2003c	USEPA default recommendation.
IR _{soil}	mg/day	50	100	--	USEPA 2009	USEPA recommended default for workers.
EF _{soil}	days/yr	219	10	--	USEPA 1993 and Professional Judgement	CTE exposure parameter
IR _{groundwater}	L/day	0.7	--	--	USEPA 1991a and Professional Judgement	CTE exposure parameter
IR _{sediment}	mg/day	--	--	25	Professional Judgement	CTE exposure parameter
IR _{surface water}	L/day	--	--	0.0025	Professional Judgement	CTE exposure parameter. Assumes 5 mL/hour; 0.5 hours/day.
EF _{sediment/surface water}	days/yr	--	--	44	Professional Judgement	CTE exposure parameter
AF	(unitless)	0.17 (soil) 0.2 (groundwater)	0.17	0.17 (sediment) 0.2 (surface water)	USEPA 2003c and USEPA 2001c	0.2 * media-specific RBA (RBA = 0.84 for soil/sediment; RBA = 1.0 for water).
Ratio _{fetal/maternal}	(unitless)	0.9	0.9	0.9	USEPA 2003a	USEPA default recommendation.
GSD	(unitless)	1.5	1.5	1.5	AGEISS 1996	

-- = Model input not applicable to this receptor.

AGEISS 1996. Calculating Blood Lead Variability for Women of Child Bearing Age. Memo from Susan Walker (AGEISS Environmental, Inc.) to Susan Griffin (USEPA Region 8). July 12.

USEPA 1993. Superfund's standard Default Exposure Factors for the CTE and RME.

USEPA 1997. Exposure Factors Handbook

USEPA 2002a. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

USEPA 2003c. Recommendations of the Technical Review Workgroup for Lead - an approach for assessing risks associated with adult exposure to lead in soil.

USEPA 2009b. Frequent Questions on the Alm, Addressing Lead at Superfund Sites. Soil ingestion rate for construction scenario.

<http://www.epa.gov/superfund/health/contaminants/lead/almfaq.htm>. (accessed March 2009).

Table 3-8 IEUBK Model Inputs

CONCENTRATION OF SOIL AND INDOOR DUST

C_{soil} (on-site) = 95% UCL on the mean soil concentration at an exposure unit

C_{dust} (on-site and off-site) = $0.43 \cdot C_{\text{soil}}$ (based on Binhgam Creek)

CONSTANT MODEL INPUTS

PARAMETER	VALUE
Air concentration (ug/m ³)	0.10
Indoor air concentration	30% of outdoors
Drinking water concentration (ug/L)	4.0
Absorption Fractions: Air Diet Water Soil/Dust [1]	32% 50% 50% 42%
Fraction soil	45%
GSD [2]	1.4

AGE DEPENDENT MODEL INPUTS

Age	AIR		DIET	WATER	SOIL
	Time Outdoors (hrs)	Ventilation Rate (m ³ /day)	Dietary Intake [3] (ug/day)	Intake (L/day)	Intake (mg/day)
0-1	1.0	2.0	2.26	0.20	85
1-2	2.0	3.0	1.96	0.50	135
2-3	3.0	5.0	2.13	0.52	135
3-4	4.0	5.0	2.04	0.53	135
4-5	4.0	5.0	1.95	0.55	100
5-6	4.0	7.0	2.05	0.58	90
6-7	4.0	7.0	2.22	0.59	85

[1] Based on site-specific bioavailability of lead in residential soils at VBI70 OU1 (USEPA 2001).

[2] Based on Griffin et al. (1999).

[3] Revised USEPA (2008a) recommended dietary intake parameters, based on updated dietary lead estimates from the Food and Drug Administration's Total Diet Study (FDA 2006) and food consumption data from NHANES III (CDC 1997) .

Table 4-1. Human Health Toxicity Values

CHEMICAL	INGESTION			
	Oral SF (mg/kg-day) ⁻¹	Source	Oral RfD mg/kg-day	Source
Antimony	--	--	4.0E-04	I [1]
Arsenic	1.5E+00	I	3.0E-04	I [1]
Cadmium	--	--	1.0E-03	I [1]
Cadmium-water	--	--	5.0E-04	I [1]
Cobalt	--	--	3.0E-04	P [1]
Copper	--	--	4.0E-02	H [1]
Iron	--	--	7.0E-01	P [1]
Manganese	--	--	4.7E-02	I [1, 2]
Silver	--	--	5.0E-03	I [1]
Thallium	--	--	6.5E-05	I [1, 3]
Vanadium	--	--	5.0E-03	I [1, 4]
Zinc	--	--	3.0E-01	I [1]

SF = Cancer Slope Factor

RfD = Noncancer Reference Dose

I = IRIS

H = HEAST

E = EPA-NCEA Provisional Value

O = Other

P = EPA Provisional Peer-Reviewed Toxicity Value

-- = A USEPA Recommended toxicity value is not available for this chemical

Notes:

[1] As cited in the Regional Screening Tables (April 2009 update).

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm (accessed May 26, 2009).

[2] RfDo (1.4E-01 mg/kg-day) adjusted by a modifying factor of 3, in accord with IRIS and USEPA Region 8 recommendations.

[3] RfDo for thallium sulfate (8E-05) adjusted by multiplying by 81% (the percent molecular weight of thallium in thallium sulfate) in order to factor out the molecular weight (MW) of the sulfate ion.

[4] RfDo for vanadium pentoxide (9E-03) adjusted by multiplying by the percent molecular RfDo for vanadium pentoxide (9E-03) adjusted by multiplying by the percent molecular weight of the oxide ion.

**Table 5-1. Estimated Risks to Commercial Workers
from the Incidental Ingestion of Surface Soil**

Exposure Unit	NON-CANCER HI		CANCER RISK		P10 % (Lead)
	CTE	RME	CTE	RME	
C1	1E-02	2E-02	2E-07	2E-06	<0.1%
C2	1E-01	3E-01	9E-07	1E-05	70%

Shaded cells indicate locations where noncancer risks exceed an HI of 1E+00 , a cancer risk of 1E-04, or a P10 value of 5%.

C = Commercial Exposure Unit

CTE = Central Tendency Exposure

P10 = Probability of a blood lead level above 10 ug/dL in the fetus of an exposed worker

RME = Reasonable Maximum Exposure

**Table 5-2. Estimated Risks to Construction Workers
from Incidental Ingestion of Surface and Subsurface Soil**

A. Residential Exposure Units

Exposure Unit	NON-CANCER HI		CANCER RISK		P10 % (Lead)
	CTE	RME	CTE	RME	
R1	4E-02	2E-01	7E-07	4E-06	<0.1%
R2	1E-01	6E-01	1E-06	5E-06	>95%
R3	5E-03	3E-02	9E-08	5E-07	<0.1%
R4	1E-02	7E-02	2E-07	1E-06	<0.1%

Shaded cells indicate locations where noncancer risks exceed an HI of 1E+00 , a cancer risk of 1E-04, or a P10 value of 5%.

B. Commercial Exposure Units

Exposure Unit	NON-CANCER HI		CANCER RISK		P10 % (Lead)
	CTE	RME	CTE	RME	
C1	1E-02	5E-02	1E-07	6E-07	<0.1%
C2	1E-01	5E-01	7E-07	4E-06	18%

Shaded cells indicate locations where noncancer risks exceed an HI of 1E+00 , a cancer risk of 1E-04, or a P10 value of 5%.

C = Commercial Exposure Unit

CTE = Central Tendency Exposure

P10 = Probability of a blood lead level above 10 ug/dL to the fetus of an exposed worker

R = Residential Exposure Unit

RME = Reasonable Maximum Exposure

**Table 5-3. Estimated Risks to Future Residents
from the Incidental Ingestion of Surface Soil**

Exposure Unit	NON-CANCER HI		CANCER RISK		P10 % (Lead)
	CTE	RME	CTE	RME	
R1	1E-01	4E-01	6E-06	6E-05	6.9%
R2	9E-01	3E+00	1E-05	1E-04	>95%
R3	4E-02	1E-01	1E-06	1E-05	5.9%
R4	7E-02	2E-01	4E-06	3E-05	1.5%

Shaded cells indicate locations where noncancer risks exceed an HI of 1E+00 , a cancer risk of 1E-04, or a P10 value of 5%.

CTE = Central Tendency Exposure

P10 = Probability of a blood lead level above 10 ug/dL in an exposed child (age 0 - 6 years)

R = Residential Exposure Unit

RME = Reasonable Maximum Exposure

Table 5-4. Estimated Risks to Current/Future Recreational Visitors from the Incidental Ingestion of Surface Water and Sediment

Panel A: Surface Water (Total Metals)

Location	HI		Cancer Risk		P10 (Lead)
	CTE	RME	CTE	RME	
Upstream Reference (N43)	4E-05	1E-03	5E-10	7E-08	<0.1%
Downstream (N46)	3E-05	1E-03	4E-10	5E-08	<0.1%

Panel B: Sediment

Location	HI		Cancer Risk		P10 (Lead)
	CTE	RME	CTE	RME	
Upstream Reference (N43)	5E-04	1E-05	7E-07	8E-08	<0.1%
Downstream (N46)	5E-04	1E-05	7E-07	8E-08	<0.1%

Shaded cells indicate locations where noncancer risks exceed an HI of 1E+00 , a cancer risk of 1E-04, or a P10 value of 5%.

CTE = Central Tendency Exposure

HI = Hazard Index

P10 = Probability of a blood lead level above 10 ug/dL in the fetus of an exposed visitor

RME = Reasonable Maximum Exposure

Table 5-5
Combined Risks to Recreational Visitors from Surface Water and Sediment

Exposure Unit	Non-Cancer HI						Cancer Risk						P10 _{fetus} (%) (lead)
	Surface Water		Sediment		Total		Surface Water		Sediment		Total		
	CTE	RME	CTE	RME	CTE	RME	CTE	RME	CTE	RME	CTE	RME	
Upstream Reference (N43)	4E-05	1E-03	5E-04	1E-05	5E-04	1E-03	5E-10	7E-08	7E-07	8E-08	7E-07	1E-07	<0.1%
Downstream (N46)	3E-05	1E-03	5E-04	1E-05	5E-04	1E-03	4E-10	5E-08	7E-07	8E-08	7E-07	1E-07	<0.1%

Total Risk (CTE) = CTE Risk (pathway 1) + CTE (pathway 2)
Total Risk (RME) = RME Risk (pathway 1) + RME (pathway 2)

CTE = Central Tendency Exposure

HI = Hazard Index

P10 = Probability of a blood lead level above 10 ug/dL in the fetus of an exposed recreational visitor

RME = Reasonable Maximum Exposure